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The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 24

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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Ex parte STAN A. ZISMAN

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Appeal No. 97-3640  
Application No. 08/406,272<sup>1</sup>

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ON BRIEF

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Before WINTERS, WILLIAM F. SMITH, and SPIEGEL, Administrative Patent Judges.  
SPIEGEL, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the examiner's final rejection of claims 1 through 25, which are all of the claims pending in this application. We affirm-in-part.

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<sup>1</sup> Application for patent filed March 16, 1995. According to appellant, this application is a continuation of Application 08/181,738, filed January 18, 1994, now abandoned.

### BACKGROUND

The appellant's invention relates to a process for substantially removing CO<sub>2</sub> from a CO<sub>2</sub> containing C<sub>2</sub>-C<sub>6</sub> olefin fluid stream by (1) adding water to the fluid to form a water-containing fluid; and, (2) contacting the water-containing fluid with a composition comprising an alkali metal compound and/or an alkaline earth metal compound, wherein the water and composition are each present in an amount effective to substantially remove CO<sub>2</sub>. Claims 1, 12 and 23 are illustrative of the claimed subject matter.

1. A process comprising the steps of:  
(1) adding water to a fluid to form a water-containing fluid; and thereafter  
(2) contacting said water-containing fluid with a composition which comprises an oxygen-containing metal compound selected from the group consisting of an alkali metal compound, an alkaline earth metal compound, and combinations of two or more thereof; wherein said fluid comprises at least one C<sub>2</sub>-C<sub>6</sub> olefin and carbon dioxide; the physical form of said fluid is selected from the group consisting of gas, liquid, and combinations thereof; said process is carried out under conditions sufficient to substantially remove said carbon dioxide from said fluid; and said composition and said water are each present in an effective amount to substantially remove said carbon dioxide from said fluid.

12. A process according to claim 1 wherein said water-containing fluid is saturated with water.

23. A process for substantially removing carbon dioxide from a fluid stream comprising the steps of:

(1) adding water to a fluid to form a water-containing fluid stream; and thereafter  
(2) contacting said water-containing fluid stream with a substantially solid composition under conditions sufficient to substantially remove said carbon dioxide from said fluid stream wherein said fluid stream comprises an olefin selected from the

group consisting of ethylene, propylene, and combinations thereof; said composition is soda lime; the weight ratio of said carbon dioxide to said fluid stream is in the range of from 0.000001:1 to 0.01:1; and the amount of said soda lime is in the range of from 2 g to 5 g per g of CO<sub>2</sub> in said water-containing fluid stream which is contacted with said composition.

Claim 7 requires a weight ratio of carbon dioxide to olefin from about 0.000001:1 to about 0.1:1.

Claim 9 requires contacting the olefin with about 1 to about 20 g of oxygen-containing metal compound per g of carbon dioxide. Claim 13 requires a weight ratio of "added" water to olefin from about 0.0001:1 to about 0.1:1. Claims 16 and 18 require the carbon dioxide removal step to be carried out at a temperature from about 1EC to about 50EC and at a pressure from about 0 psig to about 2500 psig, respectively.

The prior art references of record relied upon by the examiner in rejecting the appealed claims are:

Cheron et al. (Cheron)	4,063,899	Dec. 20, 1977
Jones, Jr. et al. (Jones)	4,313,916	Feb. 02, 1982
Skraba	4,384,160	May 17, 1983
Strack et al. (Strack)	5,090,977	Feb. 25, 1992
McKernan et al. (McKernan) (UK Patent Application)	2,267,096	Nov. 11, 1993

*HYDROCARBON PROCESSING* excerpt (HP), "Sofnolime RG," April 1992.

The prior art references of record relied upon by the appellant are:

Ventriglio et al. (Ventriglio)	3,619,130	Nov. 09, 1971
Hogan et al. (Hogan)	4,493,715	Jan. 15, 1985

### THE ISSUES

The issues presented for review are: (1) whether the examiner erred in rejecting claims 1-5 under 35 U.S.C. § 102(b) as anticipated by Skraba; (2) whether the examiner erred in rejecting claims 1-5, 9-11 and 16-19 under 35 U.S.C. § 103(a) as unpatentable over Skraba in view of Strack; (3) whether the examiner erred in rejecting claims 23-25 under 35 U.S.C. § 103(a) as unpatentable over McKernan in view of Jones; (4) whether the examiner erred in rejecting claims 1-25 over 35 U.S.C. § 103(a) as unpatentable over HP in view of Cheron; and, (5) whether the examiner erred in provisionally rejecting claims 1-25 under the judicially created doctrine of obviousness-type double patenting over claims 1-25 of copending Application 08/162,241 in view of Cheron.

### DELIBERATIONS

Our deliberations in this matter have included evaluation and review of the following materials: (1) the instant specification, including all of the claims on appeal; (2) appellant's Appeal Brief before the Board; (3) the Examiner's Answer; (4) the above-cited prior art references; and, (5) the pending claims in Application 08/162,241.

### OPINION

*1. Rejection of claims 1-5 under 35 U.S.C. § 102(b) as anticipated by Skraba*

Skraba describes a process for steam cracking an alkane hydrocarbon stream wherein alkane 1, 2 feeding through a vaporizer 3 has steam 4 added thereto and the admixture is then fed into a cracking furnace 8 where the feed is heated to ethylene production conditions. The furnace effluent 11 containing ethylene, propylene, carbon dioxide, steam and other materials is passed to prequench zone 12 to decrease the temperature of the effluent 11 so coking and deposition is minimized in subsequent equipment. The prequenched effluent is passed to transfer line exchanger 16 from which the cooled mass is passed to final quench 18 and then to aqueous caustic washer 23 (for CO<sub>2</sub> removal). From caustic washer 23 the mass is passed to fractionation 26 for recovery of wanted products. (col. 2, line 67 to col. 3, line 42; col. 4, lines 22-25, "Furnace Effluent (11)"; and, the Figure)

The appellant argues (a) steam is added to a *saturated* hydrocarbon, e.g., ethane/propane, not to an olefin, at line 4; (b) adding steam to a gas which is not an olefin and is to be thermally cracked at 1500E to 1600E F is *not* what is being claimed; and, (c) water is added to the transfer line *exchanger* 16, not to the olefin. Since Skraba excludes the step (1) of the claimed invention of adding water to a fluid to form a water-containing fluid comprising at least one C<sub>2</sub>-C<sub>6</sub> olefin and CO<sub>2</sub> and step (2) that **said** water-containing fluid is contacted with..., Skraba cannot anticipate claims 1-5 (Br. page 7).

The examiner states "the position of the final rejection is: that what transpires in cracking furnace 8 of Skraba, constitutes exactly a step of 'adding water to an olefin-containing fluid to form a water-

containing fluid' " (Ans. page 11, paragraph 4). "Note further that the steam-alkane mixture '6' which is continuously flowing into the cracking furnace '7' wherein the olefin is first created, can in fact constitute an adding of water to an olefin-containing fluid" (Ans. page 12, paragraph three).

In our view, however, there is insufficient evidence in this record of exactly what is transpiring in the furnace in order to determine whether the process which is taking place in the furnace can reasonably be said to include the "adding" step required by the claims. For example, if the furnace has a flow-through feed line and a portion of the incoming feed line of alkane-steam mixture were visualized as three sequential segments during the process, then as the first segment was emerging from the furnace as a cracked effluent, the second segment would be within the furnace in the process of being cracked, and the third segment would just be entering the furnace. The third segment would not appear to be adding water/steam to either the first or the second segments. It is unclear how the second segment could add water/steam to itself. The examiner simply has not explained how "what transpires in cracking furnace 8" inherently adds water to an olefin-containing fluid. It is well established that inherency cannot be established by probabilities or possibilities. *In re Oelrich*, 666 F.2d 578, 581, 212 USPQ 323, 326 (CCPA 1981) citing *Hansgirg v. Kemmer*, 102 F.2d 212, 214, 40 USPQ 665, 667 (CCPA 1939).

Moreover, the examiner's statement

that the Final rejection clearly states that the limitation of "adding water" is met by the addition of steam at line 4. This has nothing to do with a transfer line exchanger. (Ans. page 12, paragraph four)

backpedals from his earlier statement

[a]ccording to the figure, water is added to said gaseous stream in a transfer line exchanger. This cools the mass which is then sent to an aqueous caustic (i.e., NaOH) washer in order to remove the carbon dioxide. (Ans. page 3, third paragraph from the bottom)

Suffice to say, to the extent the examiner refers to the addition of steam from line 4 to line 6 as the "adding" step required by the claims, the examiner has not established that line 6 contains the required olefin and carbon dioxide.

Based upon this record, we conclude the examiner has not established that Skraba teaches the first step of the claimed invention, i.e. of adding water to a fluid to form a water-containing fluid comprising at least one C<sub>2</sub>-C<sub>6</sub> olefin and CO<sub>2</sub>. A reference which does not satisfy one limitation of a claim does not anticipate. *Jamesburg Corp. v. Litton Industrial Products*, 756 F.2d 1556, 225 USPQ 253 (Fed. Cir. 1985); *Atlas Powder Co. v. E.I. DuPont de Nemours Co.*, 750 F.2d 1569, 224 USPQ 409 (Fed. Cir. 1984).

The rejection is reversed.

*2. Rejection of claims 1-5, 9-11 and 16-19 under 35 U.S.C. § 103 (a) over  
Skraba in view of Strack*

Skraba has been described *supra*.

Strack describes a process for separating propylene from a mixture of cracked hydrocarbons produced by a cracking unit. A feed 10 of alkanes, naphtha or gas oil, or combinations thereof is introduced into a cracking furnace 12. The cracked gases 11 leaving the furnace 12 are quenched 14 and compressed 17. The compressed gases are fed into an acid gas removal vessel 16 where they undergo acid gas removal, typically with the addition of a base such as NaOH 18. The gases are dried in dehydration system 13 and thereafter separated into various fractions. (abstract; col. 4, lines 15-43).

The examiner relies on Strack "[t]o the extent the Skraba reference is construed as not describing sodium hydroxide in its description of the 'caustic' zone" (Ans. page 4, paragraph 4). The examiner also relies on Strack to show that effluent steam-cracked gases in line 19 have water in them when they contact the caustic washer/acid gas removal vessel based upon subsequent drying in dehydration system 13 (Ans. paragraph bridging pages 4-5). Finally, the examiner states the relative amounts of sodium hydroxide (oxygen-containing metal compound) to CO<sub>2</sub> (claims 9-11); and, the specific reaction conditions of temperature (claims 16-17) and pressure (claims 18-19) are well known, art-recognized, result-effective variables and concludes it would have been obvious to one of ordinary skill in the art to optimize these variables (Ans. page 5, paragraph three).

Appellant argues neither Skraba nor Strack teaches a positive step of "adding" water to an olefin-containing fluid and thereafter contacting **the** water-containing fluid with a composition such as



soda lime (Br. pages 8-9). Furthermore, water can be present in the acid gas removal vessel 16 either due to the NaOH itself which is only moisture-free if in a strictly dry environment such as a dry box; or, as a result of the chemical reaction between the acid gas and the NaOH. The presence of water in line 19 does not suggest a positive step of "adding water" to an olefin-containing gas or that positively "adding water" to an olefin-containing gas would improve the CO<sub>2</sub> removal therefrom (Br. pages 9-10). Moreover, the claimed process is not limited to cracked gases, but can be used with substantially pure stored olefin (Br. page 10). Finally, because the combined disclosure of Skraba and Strack does not suggest adding water to an olefin-containing fluid to improve CO<sub>2</sub> removal, the references are irrelevant to the conditions recited in claims 9-11 and 16-19 which parameters provide exceptional results in CO<sub>2</sub> removal (Br. pages 10-11).

Notably, the examiner does not rely on Strack for teaching adding water to a fluid to form a water-containing fluid comprising at least one C<sub>2</sub>-C<sub>6</sub> olefin and CO<sub>2</sub>. We agree with appellant that Strack does not cure the deficiency of Skraba, i.e., Strack does not teach a positive step of "adding" water to an olefin-containing fluid, regardless of dehydration system 13. Since neither Skraba nor Strack disclose or suggest the first step of the claimed invention, i.e., of adding water to a fluid to form a water-containing fluid comprising at least one C<sub>2</sub>-C<sub>6</sub> olefin and CO<sub>2</sub>, the examiner has failed to establish a *prima facie* case of obviousness in regard to the subject matter as a whole. 35 U.S.C. § 103(a). With regard to the discussions of the claimed invention's applicability to substantially pure stored olefin

and of exceptional results (Br. pages 10-11), having concluded that the examiner has not established a *prima facie* case of obviousness from the teachings of the prior art we do not reach this rebuttal evidence.

The rejection is reversed.

*3. Rejection of claims 23-25 under 35 U.S.C. § 103(a) over McKernan in view of Jones*

McKernan removes carbon dioxide from liquid and gaseous olefin-containing fluids by passing the fluid through a bed of solid particulate absorbent material comprising sodium hydroxide and/or potassium hydroxide; alumina and/or zinc oxide; lime; and, optionally copper II oxide (abstract), e.g., prior to catalysis to avoid poisoning or otherwise adversely affecting the catalyst employed (page 1, paragraph two). Preferably, the composition contains up to 10 wt. % NaOH and 40-97% Ca(OH)<sub>2</sub>, i.e., soda lime (Table page 3). According to the examiner, McKernan differs from claim 23 in failing to state literally that the olefin fluid also comprises water (Ans. page 6, paragraph one).

Jones discloses

...in order to make suitable grade ethylene for the production of certain grades of polyethylene, small concentrations of CO<sub>2</sub> (of approximately 10-25 ppm) in the olefin feed have to be reduced to less than 1ppm. One present practice uses a caustic pellet absorber bed. Two major problems associated with this procedure are: (i) only about 3 percent of the NaOH present in the bed is converted to Na<sub>2</sub>CO<sub>3</sub> (via 2NaOH + CO<sub>2</sub> → Na<sub>2</sub>CO<sub>3</sub> + H<sub>2</sub>O); and (ii) after the outer coat of the pellet is converted to the carbonate, the water generated can cause particle agglomeration and bridging which in turn causes channeling and finally complete solidification of the bed. The latter is a particularly difficult problem because the bed contents at times have had to be removed manually. An aqueous caustic solution has been proposed as an alternative. One

problem with this approach is that the water vapor from the solution is introduced into the ethylene, thus necessitating zeolite water-absorption beds which (i) would be large and costly to install; and (ii) would be expensive to regenerate. (col. 2, lines 24-45)

Accordingly, Jones removes trace amounts of carbon dioxide from olefin gases by passing the gas through an essentially non-aqueous liquid solution of alkali or alkaline earth metal hydroxides and/or weak acid salts and certain selected liquid polyhydric alcohols (abstract). In cases where the ethylene feed also contains trace amounts of water, a potassium-based system eliminates the need for water-removing adsorbents or at least reduces their size considerably (col. 14, lines 25-34).

According to the examiner,

[i]t would have been obvious to one of ordinary skill in the art at the time the invention was made to have contacted a fluid comprising ethylene, CO<sub>2</sub> and water with a soda-lime product such as is disclosed in McKernan, in order to remove CO<sub>2</sub>, because McKernan teaches that CO<sub>2</sub> should be removed from ethylene in order not to poison downstream catalysts, and because Jones teaches that there exist fluids comprising CO<sub>2</sub>, water, and ethylene from which CO<sub>2</sub> should be removed prior to catalytic polymerization into polyethylene.

With respect to the weight ratio of CO<sub>2</sub> to fluid recited in claim 23, note that Jones teaches CO<sub>2</sub> as being present in 10-25 ppm (col. 2, lines 24-25), which falls into the broad range claimed. (Ans. page 6, last two paragraphs)

Appellant argues neither McKernan, nor Jones, nor the combination of McKernan and Jones, disclose or suggest (i) contacting a water-containing fluid with a substantially solid composition (Br. page 12, last paragraph) or (ii) *the positive step of adding water to an olefin fluid* to improve CO<sub>2</sub> removal and contacting the resulting water-containing fluid with a composition such as soda lime (Br. page 13, paragraph two). Appellant submits the examiner not only continues to ignore the step of

"adding water ..." but also continues to interpret the claimed invention as merely requiring a water-containing fluid (Br. page 12, paragraph one). Furthermore, both the non-aqueous system and the express disclosure "that any relatively small amount of water vapor contained in the non-reacting gas feed (introduced therein prior to or during a process for the production or treatment of the non-reacting gas) is scavenged by the polyhydric alcohol and alkali of the absorbent solution" (col. 4, lines 53-57) in Jones teaches away from the claimed invention which specifically calls for adding water (Br. page 12, paragraphs two and three).

We initially note that we agree with the examiner that McKernan explicitly discloses a solid CO<sub>2</sub> absorbent material at page 2, lines 7-9 (Ans. pages 14-15).

However, the question remains whether or not McKernan and/or Jones disclose or suggest a step of **adding** *water to an olefin-containing fluid*. At page 2, paragraph 3, McKernan discloses his absorbent composition preferably contains copper II oxide, "especially when the composition is to be used in the treatment of dry (anhydrous) hydrocarbon materials." This clearly suggests the olefin-containing fluid can be either wet or dry to begin with. Moreover, use of "wet" samples is seen in the examples of McKernon. Similarly, Jones suggests the ethylene feed can already be wet, i.e. contain trace amounts of water as an impurity (col. 10, lines 7-11 and col. 14, lines 30-33). Belatedly, the examiner urges that the claimed "adding of water" reads on the "introducing of water" suggested by Jones (Ans. paragraph bridging pages 14-15). However, the examiner has not established that any of

the "wet" streams described by the reference disclose or suggest the "adding" step required by the claims. For the reasons outlined above, we are not persuaded that the examiner has established a *prima facie* case of obviousness.

The rejection is reversed.

*4. Rejection of claims 1-25 under 35 U.S.C. § 103(a) over HP in view of Cheron*

At the outset, we note that although appellant has indicated that claims 1-11 and 13-15 stand or fall together (Br. page 4), he has separately argued the CO<sub>2</sub> impurity content of claims 7-8 and 20-23; the weight ratio of soda lime to CO<sub>2</sub> of claims 9-11 and 20-23; the temperature and pressure parameters of claims 16-19; and, the weight ratio of "added" water to olefin of claims 13-15 (Br. page 18, paragraph two). In addition, appellant has indicated that claim 12 does not stand or fall together with claims 1-11 and 13-25 because claim 12 specifically calls for a *water-saturated*, olefin-containing fluid (Br. page 4). Thus, we will consider the merits of the rejection as it pertains to (a) claim 1, (b) specific parameter claims 7, 9, 13, 16 and 18. (c) *water-saturated*, olefin-containing fluid claim 12.

*a. Claim 1*

As to claim 1, HP describes removing low levels of acidic impurities, such as CO<sub>2</sub>, from natural gas, ethylene, propylene and LPG containing less than 50 ppb acid impurities using a mixture of NaOH and Ca(OH)<sub>2</sub>, i.e., soda lime (entire excerpt).

Cheron relates to removing CO<sub>2</sub> from a gas or gas mixture. Cheron discloses that gas passing through a CO<sub>2</sub> removal filter cartridge of soda lime reduces the water content of the soda lime, thereby resulting in a high decrease in the absorption capacity of the filter cartridge with respect to CO<sub>2</sub> (col. 2, lines 15-20). Cheron suggests two means for re-introducing water into the soda lime, one means being flowing the gas through a directly humidified portion of the filter and allowing the gas to carry along a certain quantity of water which humidifies the upper portion of the filter cartridge (col. 3, lines 8-12) and the other means being introducing water into the gas to be decarbonated, using any known means to increase the hygrometric degree (col. 5, lines 3-6). Optimum efficiency of the decarbonator is permitted by automatic compensation of the water losses due to the passage of the gas through the cartridge so that the water content of the soda lime remains substantially in the range from 10 to 30% (col. 4, lines 42-48).

According to the examiner

[i]t would have been obvious to one of ordinary skill in the art at the time the invention was made to have added water to the gas treated by HP prior to its contact with soda lime, because Cheron teaches that adding water to a gas prior to its contact with soda lime humidifies the soda lime and hence enhances CO<sub>2</sub> absorption such as is desired by HP. (Ans. page 8, paragraph two)

We find no error in the examiner's conclusion of obviousness in regard to claim 1.

Appellant argues Cheron is non-analogous art because Cheron (1) neither discloses nor suggests removing CO<sub>2</sub> from an olefin-containing fluid nor (2) relates to the problem of high CO<sub>2</sub> content poisoning an olefin polymerization catalyst (Br. page 14 and paragraph bridging pages 17-18).

The determination that a reference is from a nonanalogous art is twofold, requiring first a decision if the reference is within the field of the inventor's endeavor; and, if not, whether the reference is reasonably pertinent to the particular problem with which the inventor was involved. *In re Wood*, 599 F.2d 1032, 202 USPQ 171 (CCPA 1979).

Here, references relating to removal of CO<sub>2</sub> from gaseous fluids are clearly reasonably pertinent to the field of appellant's endeavor. Both HP and Cheron disclose removal of CO<sub>2</sub> from gaseous fluids. While disclosing utility with ethylene and propylene (i.e., olefin) gases, HP is not limited to olefin gases based upon HP's disclosure of LPG which one of ordinary skill in the art would have recognized also contain alkanes. Cheron discloses removing CO<sub>2</sub> from a generic gas or gas mixture. The examiner has argued

the Cheron reference is not limited with respect to what type of gas or gas mixture can be "decarbonated"; ... therefore, Cheron is presumed to be an enabling teaching for the removal of CO<sub>2</sub> from any gas, including an olefin-containing one, and therefore is reasonably pertinent to the problem of CO<sub>2</sub> removal reported in the HP excerpt. (Ans. page 15, paragraph five)

Appellant has not responded to this argument. Therefore, based upon this record, we agree with the examiner that HP and Cheron are properly combinable; and, that Cheron cannot be properly characterized as being from a non-analogous art.

Secondly, appellant argues Hogan discloses any reference disclosing or suggesting CO<sub>2</sub> removal from a non-olefin-containing gas cannot be a proper reference for the claimed invention (Br. page 14, last sentence). However, as noted by the examiner, "no such statement is seen in Hogan nor [has been] specifically pointed out by appellants [sic]" (Ans. page 15, last paragraph). Therefore, this argument is not persuasive.

Appellant next argues soda lime, not a gas, is humidified with water in Cheron (Br. page 15, first paragraph and paragraph bridging pages 17-18). This argument is factually incorrect. We agree with the examiner that Cheron explicitly teaches adding water to, i.e., increasing the hygrometric degree of, the gas to be decarbonated at col. 5, lines 3-6. Therefore, this argument is not persuasive.

Additionally, appellant argues the specification (pages 7-9) demonstrates unexpected results, i.e., a CO<sub>2</sub> capacity as high as 57 weight % when water is added to an ethylene-containing fluid versus only 1.5 weight % in the absence of water addition and when compared to HP which discloses a CO<sub>2</sub> capacity or loading of 10% (Br. page 16, paragraph two).

Example I at pages 7-9 of the specification is not sufficient to overcome the *prima facie* case of obviousness for the following reasons. First, it appears that the evidence presented in appellant's



specification confirms what a person having ordinary skill would have expected based on teachings found in Cheron, i.e., adding water to the gas passing through the soda lime absorbent will compensate for any reduction of the water content of the soda lime caused by the gas flow, thereby permitting more efficient, better purification of the gas. As often stated by the U.S. Court of Customs and Patent Appeals, expected beneficial results are evidence of obviousness of a claimed invention, just as unexpected beneficial results are evidence of unobviousness. *In re Skoll*, 523 F.2d 1392, 187 USPQ 481 (CCPA 1975); *In re Skoner*, 517 F.2d 947, 186 USPQ 80 (CCPA 1975); *In re Gershon*, 372 F.2d 535, 152 USPQ 602 (CCPA 1967). Second, we agree with the examiner that there is insufficient data to determine what breakthrough level corresponds to the 10% CO<sub>2</sub> loading in HP (Ans. page 17, paragraph three). Appellant has the burden of explaining the data, whether in the form of a direct or indirect comparison with the closest prior art. This includes noting any differences in reagent composition, assay parameters, etc. between the prior art and the experimental conditions used for the comparison proffered, as well as the reasons for and significance of such differences. Third, the single data point of example 1 does not support the scope of claim 1. Therefore, based on this record, we find the argued "unexpected results" lacks sufficient probative value to overcome the rejection.

*b. Claims 7, 9, 13, 16 and 18*

As to specific parameter claims 7, 9, 13, 16 and 18, the examiner found

that the suggested inlet impurity in HP of "less than 10 ppm" amount of CO<sub>2</sub> meets the CO<sub>2</sub> content ranges of claims 7-8 and 20-23, which range from 1 ppm up to at least 10,000 ppm CO<sub>2</sub> .

With respect to the ratio of 1-10 grams of soda lime per g of CO<sub>2</sub> in the fluid, as in claims 9-10 and 20, note that the suggested 10% loading in HP (i.e. 10 g of CO<sub>2</sub> loaded on 100g soda lime) meets this limitation. With respect to the narrower ranges of 2-5 grams soda lime per gram CO<sub>2</sub> as in claims 9-11 and 21-23, note that it would have been obvious to use lesser amounts of soda lime in a CO<sub>2</sub> -removal bed, with the expected result that CO<sub>2</sub> would still be substantially removed. Note that the HP excerpt contemplates twin beds of soda lime in series, so any breakthrough from a first bed could be caught in a second bed, both operating at the suggested loading levels.

With respect to the temperatures and pressures of claims 16-19 (e.g., 1-50EC and 1-1700 psig), note that the HP process suggests ambient (25EC) temperature and 1200 psig as operable.

With respect to the exact quantity of water "added" in claims 13-15, this would be amendable to optimization by routine experimentation, as has been held to be obvious in *In re Aller*, et al. 105 USPQ 233 and *In re Reni*, 164 USPQ 245. (Ans. pages 8-9)

Given the above teachings, we conclude that the determination of optimum values for the weight ratio of CO<sub>2</sub> impurity to olefin (claim 7); the weight ratio of soda lime to CO<sub>2</sub> (claims 9); and, the process temperature and pressure parameters (claims 16 and 18) would have been obvious to one of ordinary skill in the art. We also conclude that the determination of optimum values for the weight ratio of "added" water to olefin (claim 13), would also have been obvious to one of ordinary skill in the art, especially given the direction in Cheron to maintain the water content of the soda lime substantially constant in the range from 10 to 30% (col. 4, lines 43-49). *In re Boesch*, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980); *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Appellant argues

the HP excerpt as well as the combination of HP and Cheron does not suggest these parameters and the amount of water in claims 13-15 would ***improve the CO<sub>2</sub> removal from an olefin fluid*** if water is added to the fluid before fluid enters a soda lime. (Br. page 18, paragraph two)

For the same reasons set forth in § 4a. above, we find the argued "unexpected results" lacks sufficient probative value to overcome the rejection.

c. Claim 12

As to claim 12, the examiner accepts appellant's argument that claim 12 is separately patentable (Ans. page 2). Having accepted that appellant is separately arguing claim 12, the examiner fails to present any reasoning and/or evidence as to why the references disclose or suggest the limitation "wherein said water-containing fluid is saturated with water." Therefore, we reverse the rejection of claim 12 under 35 U.S.C. § 103(a) as unpatentable over HP in view of Cheron.

The rejection of claims 1-11 and 13-25 is sustained; the rejection of claim 12 is reversed.

5. *Provisional rejection of claims 1-25 under the judicially created doctrine of obviousness-type double-patenting over claims 1-25 of copending Application no. 08/162,241 in view of Cheron.*

At the outset, we note that appellant has indicated that claim 12 does not stand or fall together with claims 1-11 and 13-25 because claim 12 specifically calls for a *water-saturated*, olefin-containing fluid (Br. page 4).

Cheron has been described *supra*.

Claims 1-25 (now claims 1-3, 5-9 and 12-25) in copending Application no. 08/162,241 are directed to a process for removing carbon dioxide from a fluid which comprises at least one C<sub>2</sub>-C<sub>6</sub> olefin and carbon dioxide by contacting the fluid with a composition comprising (i) an alkali metal hydroxide, an alkaline earth metal hydroxide or combinations of two or more thereof, and (ii) an inorganic oxide which is alumina and/or silica, wherein the weight ratio of (i)/(ii) is from about 0.1:1 to about 5:1.

According to the examiner, none of the claims of the '241 application recite adding water to an olefin-containing fluid. However,

[i]t would have been obvious to one of ordinary skill in the art at the time the invention was made to have added water to the gas treated by the copending application prior to its contact with soda lime, because Cheron teaches that adding water to the gas prior to its contact with soda lime humidifies the soda lime and hence enhances CO<sub>2</sub> absorption such as is desired by the copending application.

Note, with respect to the soda lime limitations of the instant claims, that the claims of copending '241 clearly suggest combinations of calcium hydroxide and sodium hydroxide (see, for example, claim 5 of copending '241) and thus the process of the instant claims limited to soda lime are also not patentably distinct from those of '241. (Ans. page 10, paragraph three)

Appellant argues col. 3, lines 7-15 of Cheron does not disclose or suggest supplying water to the soda lime directly from the gas being treated; Cheron is non-analogous art and, therefore, not combinable with the '241 application; and, claim 12 is patentably distinct from claims 1-11 and 13-25 because claim 12 specifically recites a water-saturated fluid (Br. page 20, paragraph three through page 22, paragraph two). Finally, appellant argues

as disclosed in Ventriglio (U.S. 3,619,130; of record; Col. 1, lines 44-47), alkali hydroxides are subject to moisture attack with subsequent caking thus severely limiting (CO<sub>2</sub> adsorption) capacity. The present invention, as claimed, specifically recites adding water to an oxygen-containing compound such as sodium hydroxide. According to the Ventriglio teaching, the claimed invention cannot have much capacity for CO<sub>2</sub> removal. However, as discussed above, the present invention shows 57% CO<sub>2</sub> removal capacity. The claimed invention is therefore surprising. The Examiner should have considered Ventriglio in favor of appellant's claims which are patentable in view of Ventriglio disclosure. (Br. page 22, paragraph three)

There is nothing of record to indicate that the examiner has addressed the teachings of Ventriglio. Where appellant has come forward with reasonable rebuttal, whether buttressed by experiment, prior art references, or arguments, the entire merits of the matter are to be reweighed. *In re Hedges*, 783 F.2d 1038, 228 USPQ 685 (Fed. Cir. 1986). Therefore, the issue is not ripe for a decision on appeal. Accordingly, we vacate the provisional rejection of claims 1-11 and 13-25 under the judicially created doctrine of obviousness-type double-patenting over claims 1-25 (now 1-3, 5-9 and 12-25) of copending Application no. 08/162,241 in view of Cheron. If prosecution is resumed on the subject matter of these claims in a continuing application, the examiner should revisit this issue. In so doing, the examiner should take care to consider and respond to appellant's rebuttal in its entirety.

The examiner accepts appellant's argument that claim 12 is separately patentable (Ans. page 2). Having accepted that appellant is separately arguing claim 12, the examiner fails to present any reasoning and/or evidence as to why the references disclose or suggest the limitation "wherein said water-containing fluid is saturated with water." Therefore, we reverse the rejection of claim 12 under

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the judicially created doctrine of obviousness-type double-patenting over claims 1-25 (now 1-3, 5-9 and 12-25) of copending Application no. 08/162,241 in view of Cheron.

#### OTHER MATTERS

In the event of further prosecution, appellant and the examiner are advised to consider whether the recycle propane and/or ethane from line 2 of Skraba contains a small but definite amount of olefin carried over from the fractionation system 26 such that adding steam 4 to the combined feed line 6 provides a step of "adding" water to an olefin-containing fluid, i.e., line 2.

#### CONCLUSION

To summarize, the decision of the examiner (1) to reject claims 1-5 under 35 U.S.C. § 102(b) as anticipated by Skraba is **reversed**; (2) to reject claims 1-5, 9-11 and 16-19 under 35 U.S.C. § 103(a) as unpatentable over Skraba in view of Strack is **reversed**; (3) to reject claims 23-25 under 35 U.S.C. § 103(a) as unpatentable over McKernan in view of Jones is **reversed**; (4) to reject claims 1-25 under 35 U.S.C. § 103(a) as unpatentable over HP in view of Cheron is **sustained** as to claims 1-11 and 13-25, and **reversed** as to claim 12; and, (5) to provisionally reject claims 1-25 under the judicially created doctrine of obviousness-type double-patenting over claims 1-25 (now claims 1-3, 5-9 and 12-25) of copending Application no. 08/162,241 is **vacated** as to claims 1-11 and 13-25, and **reversed** as to claim 12.

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No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

**Affirmed-in-part**

SHERMAN D. WINTERS  
Administrative Patent Judge

WILLIAM F. SMITH  
Administrative Patent Judge

CAROL A. SPIEGEL  
Administrative Patent Judge

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Appeal No. 97-3640  
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APPLICATION NO. 08/406,272

APJ WINTERS

APJ SMITH, WILLIAM F.

APJ SPIEGEL

DECISION: **Affirmed-in-part**

Prepared By:

**DRAFT TYPED:** 06 Dec 99

**FINAL TYPED:**